

WHAT IS CLAIMED IS:

1. A deposition system for depositing a layer on a substrate, the deposition system comprising:

a process chamber;

5 a susceptor in the process chamber, the susceptor being configured to receive a substrate for depositing a layer thereon;

a showerhead on a side of the process chamber, the showerhead being configured to receive reaction gases and to introduce the reaction gases into the process chamber, the showerhead including a heating element therein for
10 heating reaction gases prior to introducing the reaction gases into the reaction chamber.

2. A deposition system according to Claim 1 wherein the showerhead is further configured to spray the reaction gases into the process chamber in
15 parallel with a substrate received on the susceptor.

3. A deposition system according to Claim 2 wherein the showerhead comprises:

a housing,

20 at least one inlet port through which the reaction gases are received into the showerhead; and

a spray plate adjacent the process chamber through which reaction gases are introduced into the process chamber;

wherein the heating element comprises a heating wire in the housing
25 between the inlet port and the spray plate.

4. A deposition system according to Claim 3 wherein the heating wire comprises a catalytic material.

30 5. A deposition system according to Claim 4 wherein the heating wire comprises tungsten.

6. A deposition system according to Claim 3 wherein the heating wire comprises a coiled wire.

5 7. A deposition system according to Claim 3 wherein the housing includes first and second terminals therein and wherein first and second ends of the heating wire are respectively connected to the first and second terminals.

8. A deposition system according to Claim 7 wherein each of the first
10 and second terminals comprises an elastic connecting portion to which the heating wire is connected.

9. A deposition system according to Claim 8 wherein the housing further includes insulators that electrically insulate the terminals from
15 conductive portions of the housing.

10. A deposition system according to Claim 3 wherein the showerhead further comprises a cooling portion configured to cool an outer portion of the housing.

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11. A deposition system according to Claim 10 wherein the cooling portion comprises a duct on an outer portion of the housing, wherein the duct is configured to provide circulation of a cooling fluid therethrough.

25 12. A deposition system according to Claim 1 wherein the showerhead comprises a plurality of plenums therein such that each plenum receives at least one respective reaction gas such that reaction gases from the plenums are introduced into the process chamber without prior mixing of the reaction gases between plenums within the showerhead.

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13. A deposition system according to Claim 12 wherein a first of the plenums includes a heating element therein configured to heat gases passing through the first plenum and wherein a second of the plenums is free of a heating element.

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14. A deposition system according to Claim 13 wherein the first plenum includes an extended portion such that the first plenum extends further from the process chamber than the second plenum and wherein the heating element is located in the extended portion of the first plenum.

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15. A deposition system according to Claim 14 further comprising a duct on the extended portion of the first plenum wherein the duct is configured to provide circulation of a cooling fluid therethrough.

15 16. A deposition system according to Claim 1 wherein the susceptor is configured to receive a substrate for depositing a layer thereon through atomic layer deposition.

20 17. A deposition system according to Claim 1 wherein the susceptor is configured to receive a substrate for depositing a layer thereon through chemical vapor deposition.

25 18. A deposition system according to Claim 1 further comprising a boat in the process chamber wherein the boat supports the first susceptor and at least a second susceptor with each susceptor being configured to receive at least one substrate for deposition of a layer thereon.

19. A method of depositing a layer on a substrate in a process chamber, the method comprising:
30 receiving a reaction gas in a showerhead adjacent the process chamber;
heating the reaction gas in the showerhead; and

after heating the reaction gas in the showerhead, introducing the heated reaction gas into the process chamber for deposition of the layer on the substrate in the process chamber.

- 5 20. A method according to Claim 19 wherein receiving a reaction gas in a showerhead comprises receiving a first reaction gas in a first plenum of the showerhead, wherein heating the reaction gas comprises heating the first reaction gas in the first plenum, and introducing the heated reaction gas comprises introducing the first heated reaction gas into the process chamber,
- 10 the method further comprising:
- receiving a second reaction gas in a second plenum of the showerhead;
- and
- introducing the second reaction gas into the process chamber for deposition of the layer on the substrate without heating the second reaction gas
- 15 prior to introduction into the process chamber.